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Communication

pH-Switched fluorescent *pseudo*rotaxane assembly of cucurbit[7]uril with bispyridinium ethylene derivatives

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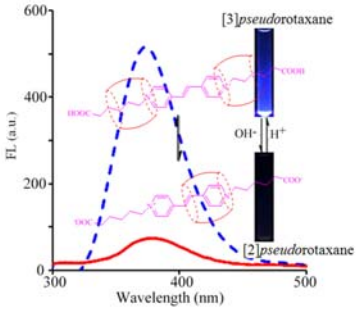
Graphical Abstract



^{1}H NMR spectra and fluorescence analysis revealed that the molecular shuttle and *pseudo*rotaxane assembly of Q[7] with guest $\mathbf{G}^{2+}$ can be significantly switched *via* protonation and deprotonation of the terminal carboxylates of the guest.

ABSTRACT

The host-guest properties of cucurbit[7]uril (Q[7]) and bispyridinium ethylene derivatives have been studied by ^{1}H NMR spectroscopy, UV-vis absorption spectra, and fluorescence emission analysis. The proton shifts associated with the guest encapsulated by the host suggested that the Q[7]-based [2]*pseudo*rotaxane behaves like a fast molecular shuttle along the bispyridinium ethylene axle of the guest upon protonation and deprotonation of the terminal carboxylates. In particular, the distinct fluorescent response signals indicated that the bispyridinium ethylene moiety not only behaves as the axle component for the *pseudo*rotaxane system, but also acts as an optical reporting unit during the host–guest complexation.

Keywords:
Cucurbit[7]uril
*Pseudo*rotaxane
Host-guest interaction
Fluorescence signal
Bispyridinium ethylene

The construction of nanometer-scale devices such as molecular machines and switches from molecular components is of major interest in modern science and technology [1]. Mechanically interlocked molecules (MIMs) such as rotaxanes and shuttles have great